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AUTHOR	Becker, Wesley C.; Engelmann, Siegfried
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ABSTRACT

The technical report provides preliminary findings on the academic achievement of over 9,000 kindergarten through grade 3 children (78 percent economically disadvantaged) involved in the Follow Through program, a structured program of academic instruction based on the principles and materials (DISTAR) of S. Engelmann and W. Becker. The following results are reported: (1) poor children starting the program in the kindergarten leave third grade with average grade level scores on the Wide Range Achievement test of 5.21 in reading, 3.86 in arithmetic, and 3.74 in spelling; (2) poor children starting the program in first grade leave third grade with average grade level scores of 4.53 in reading, 3.55 in arithmetic, and 3.37 in spelling; (3) poor children starting the program in kindergarten have a projected IQ gain of 9.1 points which is maintained through grade 3; (4) poor children starting in first grade have a projected IQ gain of 8.55 points which is cumulative over each grade; and (5) scores on the Metropolitan Achievement Test in grade 3 are at or above grade level in most subtests. The model is described as including increased manpower in the classroom and a structured daily routine. The major portion of the report consists of statistical analyses and graphs showing student progress. (DB)

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University of Oregon

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Technical Report

73-2

December 1973

Summary Analyses of Five-Year Data on Achievement and Teaching Progress with 14,000 Children in 20 Projects

Preliminary Report

Prepared by

Wesley C. Becker and Siegfried Engelmann

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SUMMARY

Having taken two 1st-starting Cohorts through 3rd grade, and one K-starting Cohort, we have been able to present preliminary findings on over 9000 children in the Gains Analysis to show the following:

a. Poor children starting the program in kindergarten leave third grade with average scores on the Wide Range Achievement Test of:

Reading	5.21 grade level
Arithmetic	3.86 grade level
Spelling	3.74 grade level

And average true gains per year of:

Reading	1.44 grades
Arithmetic	1.01 grades
Spelling	1.09 grades

b. Poor children starting the program in first grade leave third grade with average scores on the Wide Range Achievement Test of:

Reading	4.53 grade level
Arithmetic	3.55 grade level
Spelling	3.37 grade level

And average true gains per year of:

Reading	1.52 grades
Arithmetic	1.03 grades
Spelling	1.05 grades

c. Poor children starting in Kindergarten have a projected IQ gain of 9.1 points maintained through third grade. Most of this gain came from the kindergarten year of instruction.

d. Poor children starting in first grade have a projected IQ gain of 8.55 points, which is cumulative over each grade in program.

These findings on IQ point to a gain in general cognitive functioning as an outcome of the E-B Follow Through Model.

e. Children tested in the spring of 1973 on the Metropolitan Achievement test showed the following outcomes:

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K-Starting

	Post First	Post Second	Post Third
Total Reading	2.28	2.92	3.33
Total Math	1.99	2.83	3.86
Language			4.21
Spelling		3.23	3.78

1st-Starting

	Post First	Post Second	Post Third
Total Reading	1.78	2.53	2.91
Total Math	1.67	2.54	3.61
Language			4.07
Spelling		3.01	3.32

On some parts of the Metropolitan our children fall down if they have not had kindergarten in our program. But they do surprising well on many components of this test.

Note: In preparation are analysis of results by degree of implementation, a study of levels of IQ and outcome data, a case study of children with IQ's under 80, and other process analyses.

The major findings are presented in the following: Figures 1 to 9 located on pages 15, 17, 19, 24, 25, 28, 29, 32, and 33.

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1. Brief Description of Model[1]

Engelmann defined the basic problem faced in teaching disadvantaged children as one of devising a system to get more teaching going in the classroom. Only if disadvantaged children were taught more could they learn more.

Our Follow Through instructional system was developed having these components:

a. Increased manpower in the classroom.

b. Structured daily routine.

c. Daily programmed lessons.

d. An efficient teaching method.

e. Continuing training.

f. Monitoring of progress of the children and the skills of the teachers.

a. Increased manpower in the classroom. When children cannot read, the primary means available for instructing them is by talking to them. If one is to get to every child and fully utilize the school day for instruction at faster than average rate, more than one teacher is required for 25 to 30 children. Because of cost considerations, two teacher aides were used. For the most part the aides are parents of the poor children. It was our belief that parents who learned good teaching skills would also be in a better position to facilitate their children's learning at home.

b. Structuring the daily program. Manpower by itself does not insure that more teaching goes on in the classroom. The organization of the school day, a good program, and training are needed to effectively use the added manpower. The classrooms are set up so that the three "teachers" are each working in booths (for sound control) with groups of 4 to 7 children. The teachers and aides become specialists in one of the three basic programs (Reading, Language, and Arithmetic) and a schedule is devised to fit each school's time-table to rotate the children through teaching groups and other activities when the children work on their own. Approximately thirty minutes is used for small group instruction in each subject area at Level I and II. At Level III, 15 minutes of instruction is followed by thirty minutes of self-directed practice in workbooks.

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[1]For a fuller description see 1973-74 Follow Through proposal.

c. Programmed lessons. The instructional programs that are used in our Follow Through classrooms are the DISTAR™ programs (Reading, Arithmetic, and Language). These programs are potentially powerful-particularly with respect to teaching the general case.

d. An efficient teaching method. The DISTAR programs are just words on paper. In order to teach these skills, the teachers and aides must understand the concepts and operations they are teaching and must have a number of basic teaching skills. These skills involve management of the children and organization of the teaching materials so that both the children and the teacher are ready to work when they sit down in an instructional group. Beyond that, the teacher needs to know how to teach a task--any task.

To accomplish this, the teacher needs to know the formats (tasks) in the program well. She needs to know how to use attention signals to get the children to respond together (or individually) on cue. The teacher also needs to learn how to pace each task appropriately, quickly enough to hold attention, yet going slowly when required to give the children "time to think." Finally, the teacher needs to learn how to use reinforcers effectively to strengthen correct responding, and how to correct mistakes in a way which permits all children to learn each task (criterion teaching).

e. Training and supervision. The goal of training is to provide the teacher with the skills outlined above. This is accomplished in a two-week preservice workshop, continuing inservice sessions of about two hours a week, and through classroom supervision. A number of detailed procedural manuals have been prepared for trainers and participants in training. The key is to know what the teachers should be able to do, and to devise procedures to teach the required skills. It should be recognized that precision in specifying and training essential teaching skills is only possible within a structured teaching system.

Classroom supervision is provided by consultants trained by the sponsor. Many of these are former teachers from the local site. There is approximately one local supervisor for every two hundred children in the program.

f. Monitoring. The management of the progress of more than 10,000 children in 20 locations around the country requires a carefully designed monitoring system.

Built into the DISTAR programs are teacher-given tests to check each new skill as it is taught. To monitor child progress independently of the teacher, continuous progress tests (criterion referenced) are given in each area each six weeks by paraprofessionals at the Follow Through sites. Every two weeks test results in one area are summarized by child on four-copy IBM forms, (with names and numbers preprinted by group). These biweekly reports also

show absences for the two-week period and show where each group is in each program. Copies of the reports go to the teacher, the supervisor, the Follow Through Director, and our data analysis center. The reports can be used locally to directly regroup the children or to provide special remediation or acceleration. They also provide a basis for summary analyses of progress for management by the sponsor. Trouble spots can be determined and worked on.

Management reports are produced by computer to keep track of group progress. Projections are made and compared with target goals for each group for the year. When projections fall behind goals, adjustments in the program can be made at the site to attempt to reach goals before it is too late to do anything about it. Management reports also keep track of school calendars and absences so that it is possible to base projections for each site on local conditions that affect teaching days available.

2. Overview of This Report

This report presents a summary of the currently available achievement test data and process measures collected by the sponsor's research staff in each of 20 Follow Through Projects in the past five years.

Data are available on more than 15,000 children who have been in our programs.

In evaluating the findings to be presented, it should be remembered that typical gains on achievement measures have averaged about .6 grade levels per year in studies of most poor children.

The reader should be cognizant of the National Evaluation of Follow Through which uses control groups. While our data lack control groups, they do permit a self-control analysis of effects, a sequential cohort analysis, and a norm-referenced comparison. Because only a small sample of children and sites within our program are included in the National Evaluation, these data became an important adjunct to the National Evaluation.

3. Method of Data Collection

On the basis of test manuals for the Wide Range Achievement Test (WRAT) and the Slosson Intelligence Test (SIT), detailed administration and scoring procedural manuals were designed for use in training local personnel to assist in the testing (copies available on request). An audio tape was used for training in the administration and scoring of the SIT. The Metropolitan Achievement tests were either administered by SRI or following their training and administration procedures. However, in our testing (in contrast to Stanford) the classroom teacher administered the tests under the supervision of an Oregon trained supervisor.

a. Testing procedure. An Oregon (or Illinois) testing supervisor trained under Dr. Becker's supervision was assigned to each site. As many as eight Oregon trained people have gone into some sites (e.g., E. St. Louis, where we did all of the testing in 72). Usually, there was one OREGON supervisor for each 100 to 150 children to be tested. On site, a plan of testing was worked out with the directors. Most typically, this plan consisted of the local teacher supervisor, local data collectors, and the Oregon supervisor reviewing material and procedural requirements, and then breaking the testing into four components. All teachers were trained to give the MAT with aides as monitors.

The classroom teachers and aides were then trained to give one of these components of the test battery.

(1) Individual administration of the SIT (after Spring 1972, this was given only to entry level and third grade children).

(2) Oral reading and oral math parts of the WRAT.

(3) Group administered parts of the WRAT arithmetic and spelling.

Training in SIT administration usually took the longest. Testing was then carried out with the supervisors monitoring and answering any questions which arose during testing. Occasionally, monitor reports indicated that the testing conditions were not acceptable, and the tests were discarded. After the first year (Spring 1969) the procedures became easier as the local personnel became more skillful. Tests were scored the same afternoon and evening for the most part by the Oregon supervisors so that any problems might be corrected in the next day's testing.* Class lists were prepared ahead of time, and child information including verified birthdate were pre-recorded on test blanks.

b. Other information. Student-Information forms and Final-Report-of-Teaching forms were provided to the site data chiefs in the fall and spring, respectively. It was the local data chief's job to insure that such forms were returned complete. The Final-Report-of-Teaching contained information on days completed in each Distar program (Reading, Arithmetic, and Language), a record by child of days absent, and a listing of late adds and early drops from the classroom. For the past three years, the Final-Report-of-Teaching have been placed on computer prepared listings (with child I.D., name, and class information pre-printed).

4. Data Verification

Because some data were collected by persons not technically trained in research methods, all data have been treated as suspect until verified by a number of methods. These methods include:

a. Verification of each ID against a master list when not preassigned by computer.

*All tests were rescored by our staff when they came to Oregon. Starting in the Spring of 1973, all tests were computer scored.

b. Because of the move from Illinois and the change in computer systems, a new ID number system was begun at Oregon and all older data had to be reidentified using child name, address, and birthdate. Verification of this realignment was accomplished by listing child data for all available years by key variables (number, name, address, birthdate, grade, days taught in program, and WRAT scores) and visually examining each record for internal consistency. When ID inconsistencies were found, data clerks returned to the original child records (filed by child, or by class) for verification. Where inconsistencies could not be resolved from our records or site records, the child was dropped from the analysis.

c. Computer logic checks were made on all data wherever possible. I.Q.'s were checked by comparing separately entered MA's and CA's with the I.Q.'s. Possible ranges were listed out for correction or deletion. Wherever part and whole scores existed, such as for WRAT reading and arithmetic subscores, the part scores were summed and checked against the whole. Throughout, questionable data were either corrected, accepted as true, or dropped when not verifiable.

5. Method of Data Analysis

All children were assigned unique numbers and their data stored on one continuous record. The available records were then coded by grade and time of data collection to permit grouping together all children who had WRAT, SIT, and Final Reports of Teaching data from the same time periods.

For example, a child who was in the first grade in the fall of 1970, in the first grade in the spring of 1971, and the second grade in the spring of 1972 was assigned a code of 1F70 1S71 1S72. This method of coding permits analysis of the effects of retentions and skipping, since it isolates retentions clearly, e.g., the code 1S71 1S72 is obviously a rentention. It also permits us to group children from the same grade levels or cohort together if we wish, even if their pattern of test records are different. Consider these codes:

Child 1	1F69	1S70	2S71
Child 2		1S70	2S71 3S72
Child 3		1S70	1S71
Child 4		1S70	-- 3S72

Each of these children is in the cohort starting the Fall of 69. by a proper combination of their records, a maximum number of children can be studied in an analysis of gain scores. Note that child 3 is a retention. In the analysis to be reported, retentions are always placed with the group with whom they entered the program, rather than in their current grade group. Allowing retentions to score only with their current grade level would inappropriately bias the analysis of outcome.

The coding procedure also involved a by-site specification of K-starting and 1st-starting children, so that children starting in kindergarten, but first tested at the end of first grade would not be confused with children starting in first grade. Since there have been numerous changes in K-starting and 1st-starting status, this specification was made individually by site for each data year.

Coded records were grouped in two ways. First they were grouped into starting-year cohorts. Second, they were grouped into "gains" records, "singles" records, and "dummy" records. Gains records had WRAT scores and Final Reports of Teaching for more than one time period. "Singles" records had WRAT data and Final Reports of Teaching for only one time period. "Singles" were in effect the residue from the gains analysis and children just entering Cohort 4. "Dummy records" were children whose first test appeared beyond the entry grade. We put "dummy" scores in the file so they would sort out with their proper group. Since some of these children are full-time Follow Through children missed on early testing, and others are late entries to the program, we have analyzed their scores separately.

The UCLA BiMed Statistical Package was used with IBM 360 to compute means, standard deviations, ranges and gain scores. These scores were computed across all sites by cohort and grade level, for "gains" children, "singles" children, and "dummy" children and for ALL and POOR ONLY groups.

6. Subjects

The data to be analyzed are on all children in the University of Oregon E-B classrooms entering the program between Fall 1968 and Spring 1973 on whom we have acceptable data records. We presently have records on 15,033 children in our computer file. Analysis of these records shows the following:

RECORDS EXCLUDED FROM ANALYSIS				1256
Breakdown:	Bad codes		222	
	Class entered above program		237	
	Late entering singles		84	
	Head Start PV - miscoded		546	
	Head Start Only		167	
			1256	
RECORDS INCLUDED IN ANALYSIS				13777
		All	POOR	
Gains Analysis:	K-starting	4447	3631	
	1st-starting	4705	3537	
Dummy Analysis:	K-starting	552	329	
	1st-starting	468	332	
Singles Analysis:	K-starting	2031	1230	
	1st-starting	1574	824	
		13777	9883	
TOTAL RECORDS				15033

Bad codes are records where the identification code (e.g., 1F69 1S70 2S71) was impossible for one reason or another. These are being rechecked and many will be available for the next analysis. Class entering above program occurred in Las Vegas, New Mexico and Tupelo, Mississippi in 1968, and Flippin, Arkansas and Chicago, Illinois in 1969, and Cherokee, North Carolina in 1970. Later entering singles are from the groups just mentioned, but where only one test record was available. All children with Head Start Planned Variation are excluded from the present analysis because of a coding foul-up. They will be analyzed in detail in the next report.

Other exclusions. Data for children in the Gains analysis are only considered when they have been in school at least 130 days during the school year. Thus a child who entered late, dropped early, or was excessively absent, would not be considered in the evaluations of gains for the year in which he was not in the classroom the required number of days. This restriction is not applied to Dummy or Singles records.

Poor code unknown. In considering the differences in N between poor and non-poor children in the gains analysis, note that for 288 K-starting children and 146 1st-starting children we have not been able to identify their poor-nonpoor status. It is our guess that a majority of the children are poor, but they have been excluded from the POOR ONLY analysis because of a lack of information.

Retentions. Analysis shows that retentions in cohorts which have completed third grade average 6.7% in K-starting sites, and 8.0% in 1st-starting site. There is a trend for a reduction in retentions over cohorts, but it is too early to decide this. In the analyses which follow, remember that retentions are kept with their entering age mates in looking at outcomes. In our Spanish speaking sites (Dimmitt, Uvalde) retentions used to average over 50% at the 1st grade level.

Site Breakdowns. Tables 1 to 6 present tables of N by Sites and Cohorts for the Gains, Singles, and Dummy Analyses. In these tables we have labeled Cohorts as they are labeled in the National Evaluation where data on the first year (68-69) was discarded. The years of entry are:

Cohort 0	Fall, 1968
Cohort 1	Fall, 1969
Cohort 2	Fall, 1970
Cohort 3	Fall, 1971
Cohort 4	Fall, 1972

Tables 1 to 6 carry some of the history of our working with our communities and special community circumstances. For example, the

large number (224) of "Singles" for Cohort 3 and the blanks for Cohort 4 for Grand Rapids reflect the fact that we could not work out a contract to work with Grand Rapids for 1972-73. Testing troubles in Dayton in 1969 led to no scores for many children that year. In Brooklyn, Flint, and Grand Rapids a good number of children go to public school kindergarten and then switch to parochial schools. Also in these sites our earlier testing was often omitted because these sites were in the SRI sample. In Dimmitt, Texas where all children are in the program, there is a sizeable migrant group. In some sites, not all children were tested on some occasions because of conflicting schedules.

In the data tables to be presented, the N's for any given grade level in a Cohort for the Gains Analysis will be less than the total in the Cohort, because some children may only have records for two years.

Table 1

By-Site Table of N's for ALL K-Starting Children in the Gains and Singles Analysis

K-STARTING	Cohort 0		Cohort 1		Cohort 2		Cohort 3		Cohort 4		Total	
	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single
Rosebud			19	24	50	14	64	14	47	19	180	71
Flippin			24	21	24	9	37	16	46	7	131	53
Cherokee					103	8	101	12	89	9	293	29
Grand Rapids	127	55	178	56	226	78	71	[224]	—	—	602	413
Racine	45	29	100	19	124	6	121	41	98	92	488	187
West Iron Co.	26	15	47	1	45	3	42	7	16	5	176	31
Flint			90	151	138	111	82	52	86	38	396	352
Todd			104	47	129	31	155	40	115	34	503	152
Chicago (Ogden)			20	24	31	29	40	22	39	25	130	100
D.C. (Nichols)		14	41	16	48	20	68	26	90	14	247	90
Brooklyn (137)	34	37	32	48	41	46	35	58	87	7	229	196
Providence			99	57	202	21	177	49	181	13	659	140
E. St. Louis					105	68	64	93	244	56	413	217
TOTAL	232	150	754	464	1266	444	1057	654	1138	319	4447	2031

In the primary analysis of interest for evaluation of program effects, the Gains Analysis, there are 9152 children. Of these 7165 children (78%) come from OEO defined "poor" families. The poor children from Rosebud (Sioux), Todd County (Rosebud Sioux), and Cherokee (Eastern Band Cherokee) are mostly Indian; those from Dimmitt and Uvalde are mostly Chicano; those from E. Las Vegas are mostly Spanish; those from Tupelo, Grand Rapids, Flint, Dayton, Washington, D.C. Williamsburg County, Brooklyn, and E. St. Louis are mostly Black; those from Racine, Chicago, and Providence are mixed groups; and those from Flippin, Smithville, and West Iron County are mostly white.

Table 2

By-Site Table of N's for ALL 1st-Starting Children in the Gains and Singles Analyses

1ST-STARTING	Cohort 0		Cohort 1		Cohort 2		Cohort 3		Cohort 4		Total	
	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single
Chicago			29	23							29	23
Flippin			26	21							26	21
Dimmitt			188	89	140	62	129	68	144	51	601	270
Smithville	23		91	6	73	1	76	7	77	3	340	17
Tupelo	92	20	96	39	58	21	36	15	31	2	313	97
Cherokee					114	11					114	11
E. Las Vegas	100	64	81	18	33	17	26	18	32	17	272	134
Uvalde	125	18	109	7	110	12	129	18	124	1	597	56
Dayton	242	153	182	57	215	104	238	94	232	70	1109	528
Williamsburg			108	47	107	54	97	59	129	28	441	188
E. St. Louis	185	37	120	40	94	37					399	114
Providence			129	28							129	28
Rosebud	23	9	55	16							78	25
Racine	67	19									67	19
Todd	68	18	122	25							190	43
TOTAL	925	338	1336	516	944	319	731	279	769	122	4705	1574

Table 3

By-Site Table of N's for POOR-ONLY K-Starting Children in the Gains and Singles Analyses

K-STARTING	Cohort 0		Cohort 1		Cohort 2		Cohort 3		Cohort 4		Total	
	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Singl
Rosebud			19	17	41	10	59	8	14	4	133	3
Flippin			22	15	24	8	34	16	46	6	126	4
Cherokee					86	6	85	7	64	7	235	20
Grand Rapids	106	1	168	26	220	75	66	183			560	285
Racine	33	00	75	7	97	2	85	25	86	38	376	72
West Iron Co.	18	00	34	0	41	3	38	7	16	2	147	12
Flint			58	75	80	62	60	31	61	28	259	196
Todd			79	23	112	20	131	22	103	23	425	88
Chicago (Ogden)			8	12	13	12	15	5	9	6	45	35
D.C. (Nichols)		13	39	12	47	19	63	21	85	9	234	74
Brooklyn (137)	28	22	32	39	41	41	34	49	51	4	186	155
Providence			99	29	195	20	171	48	174	11	639	108
E. St. Louis					70	29	24	45	172	27	266	101
	185	36	633	255	1067	307	865	467	881	165	3631	1230

Table 4

By-Site Table of N's for POOR-ONLY 1st-Starting Children in the Gains and Singles Analyses

1ST-STARTING	Cohort 0		Cohort 1		Cohort 2		Cohort 3		Cohort 4		Total	
	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single	Gain	Single
Chicago			14	8							14	8
Flippin			23	19							23	19
Dimmitt			104	42	72	37	69	42	79	33	324	154
Smithville	23		70	1	63	0	61	5	42	3	259	9
Tupelo	70	9	87	27	50	18	31	13	26	2	264	69
Cherokee					107	5					107	5
E. Las Vegas	77	9	71	9	29	6	11	9	17	9	205	42
Uvalde	94	2	81	6	88	11	103	9	107	1	473	29
Dayton	176	66	138	110	157	68	149	56	164	11	784	311
Williamsburg			108	35	106	32	97	30	129	1	440	98
E. St. Louis	96	11	85	8	64	19					245	38
Providence			128	12							128	12
Rosebud	22	8	46	7							68	15
Racine	35	0									35	0
Todd	58	1	110	14							168	15
TOTAL	651	106	1065	298	736	196	521	164	564	60	3537	824

Table 5

By-Site Table of N's for Dummy Analysis
K-Starting Sites

	Cohort 0		Cohort 1		Cohort 2		Cohort 3		Total	
	Poor	All	Poor	All	Poor	All	Poor	All	Poor	All
Rosebud			23	31	2	4	0	1	25	36
Flippin			12	12	9	9			21	21
Cherokee					5	5	4	6	9	11
Grand Rapids	4	5	4	5					8	10
Racine	0	7	2	8	1	4			3	19
W. Iron Co.										
Flint			35	70	12	18			47	88
Todd			21	27	7	10	2	3	30	40
Chicago			8	32	3	19	5	17	16	68
D.C.	39	39	15	15	2	2			56	56
Brooklyn	22	25	23	23	14	15			59	63
Providence			3	3	2	2	0	1	5	6
E. St. Louis					50	134			50	134
TOTAL	65	76	146	226	107	222	11	28	329	552

Table 6

By-Site Table of N's for Dummy Analysis
1st-Starting Sites

	Cohort 1		Cohort 2		Cohort 3		Total	
	Poor	All	Poor	All	Poor	Alll	Poor	All
Chicago			2	9			2	9
Flippin			8	8			8	8
Dimmitt			10	18	8	15	18	33
Smithville			2	2	2	3	4	5
Tupelo	34	38	11	12	18	25	63	75
Cherokee					6	6	6	6
E. Las Vegas	5	8	3	7	5	5	13	20
Uvalde	5	7	8	8	0	2	13	17
Dayton	35	44	19	28	51	72	105	144
Williamsburg			20	20	1	7	21	27
E. St. Louis	15	29	19	24	9	16	43	69
Providence			1	1			1	1
Rosebud	4	4	1	5			5	9
Racine	3	7					3	7
Todd	18	21	9	17			27	38
	119	158	113	159	100	151	332	468

7. Results

a. Wide Range Achievement Test (WRAT)

(1) Results from Gains Analysis Averaged Over Cohorts. When the scores for all children in the Gains Analysis file are averaged within grades and across cohorts, a summary of program effects based on very sizeable N's is achieved. These summaries are presented in Tables 7, 8, and 9. Poor children starting the program in kindergarten, leave third grade with an average reading level on the WRAT of 5.2 grades. All of the k-starting children in the Gains Analysis average at the 5.3 grade level. Poor children starting the program in first grade leave third grade with an average reading level of 4.5 grades. All 1st-starting children in the Gains Analysis average at the 4.8 grade level. Figure 1 graphically presents these results for poor children only. It can be seen in Figure 1 that poor children progressively move ahead of the national norm in reading decoding skills as they move through the Engelmann-Becker Follow Through Model. It can also be seen that starting in kindergarten gives an advantage of nearly .7 grade levels over starting in first grade

Table 7

Average Over Cohorts by Grade Summary
WRAT Reading

K - Starting	Gains Analysis Poor Mean	N	Gains Analysis All Mean	N
Pre K	.17	1245	.20	1539
Post K	1.34	3138	1.42	3784
Post 1	2.92	2342	3.02	2820
Post 2	4.17	1202	4.28	1430
Post 3	5.21	372	5.29	446

1st - Starting	Gains Analysis Poor Mean	N	Gains Analysis All Mean	N
Pre 1	.36	1087	.43	1399
Post 1	1.91	3014	2.05	4045
Post 2	3.33	2601	3.51	3446
Post 3	4.53	1934	4.84	2522

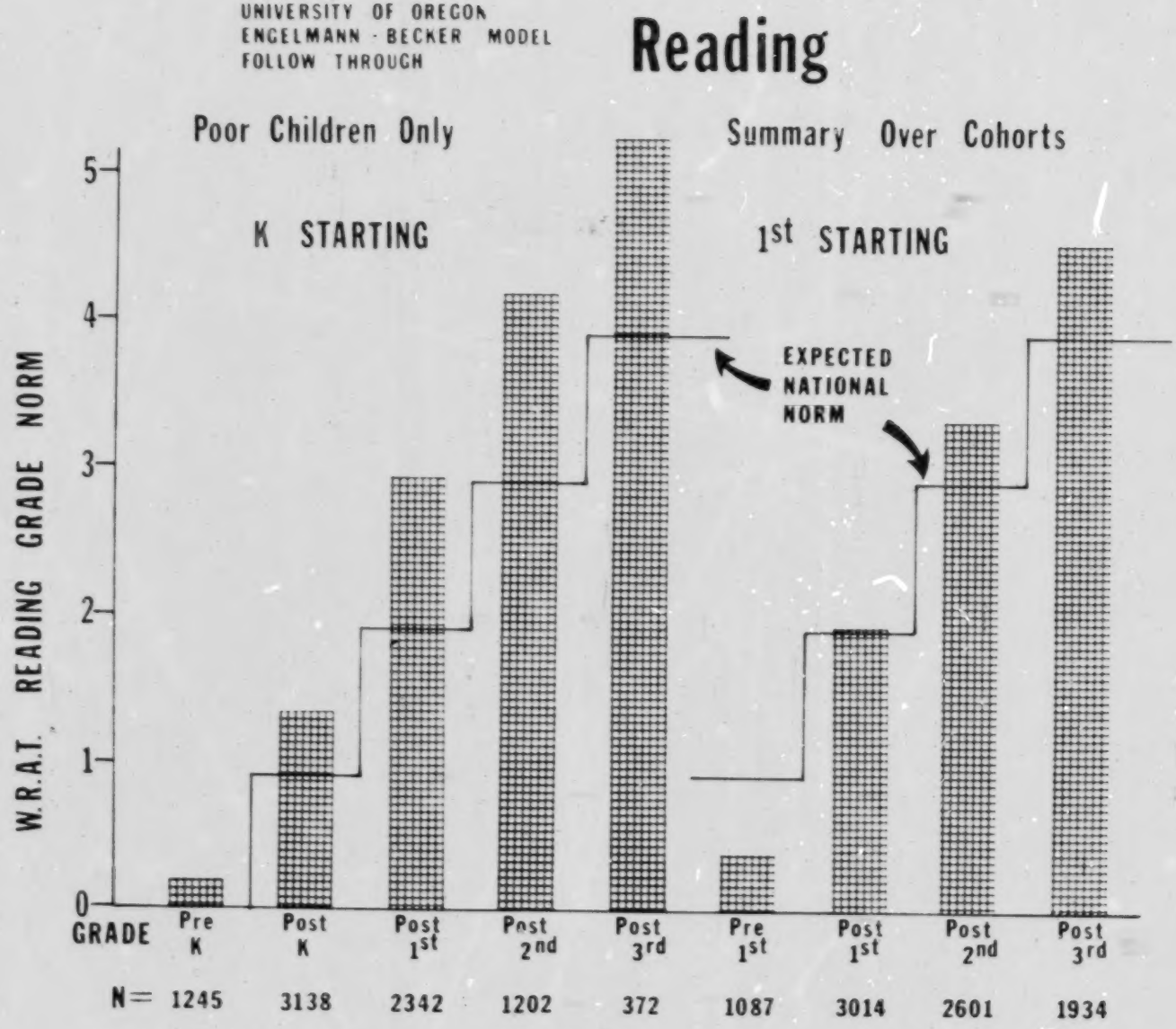
UNIVERSITY OF OREGON
ENGELMANN - BECKER MODEL
FOLLOW THROUGH
Reading
Poor Children Only
Summary Over Cohorts
K STARTING
1st STARTING
W.R.A.T. READING GRADE NORM
0
1
2
3
4
5
EXPECTED NATIONAL NORM
GRADE
Pre K
Post K
Post 1st
Post 2nd
Post 3rd
Pre 1st
Post 1st
Post 2nd
Post 3rd
N= 1245
3138
2342
1202
372
1087
3014
2601
1934

Figure 1

Table 8 and Figure 2 present a similar kind of analysis for the findings on the WRAT Arithmetic subtest. Poor children starting in kindergarten, leave third grade at grade level (3.86). Poor children starting in first grade, leave third grade slightly below grade level (3.55). As will be seen later this deficit in arithmetic performance is being overcome in later Cohorts. Our early efforts gave priority to the teaching of reading.

Table 8

Average Over Cohorts by Grade
WRAT Arithmetic

K - Starting	Gains Analysis Poor Mean	N	Gains Analysis All Mean	N
Pre K	.17	1380	.20	1694
Post K	1.38	3126	1.43	3787
Post 1	2.25	2339	2.27	2819
Post 2	2.97	1201	3.02	1429
Post 3	3.86	371	3.90	445

1st - Starting	Gains Analysis Poor Mean	N	Gains Analysis All Mean	N
Pre 1	.66	1108	.72	1421
Post 1	1.85	2999	1.95	4032
Post 2	2.59	2599	2.65	3441
Post 3	3.55	1934	3.69	2522

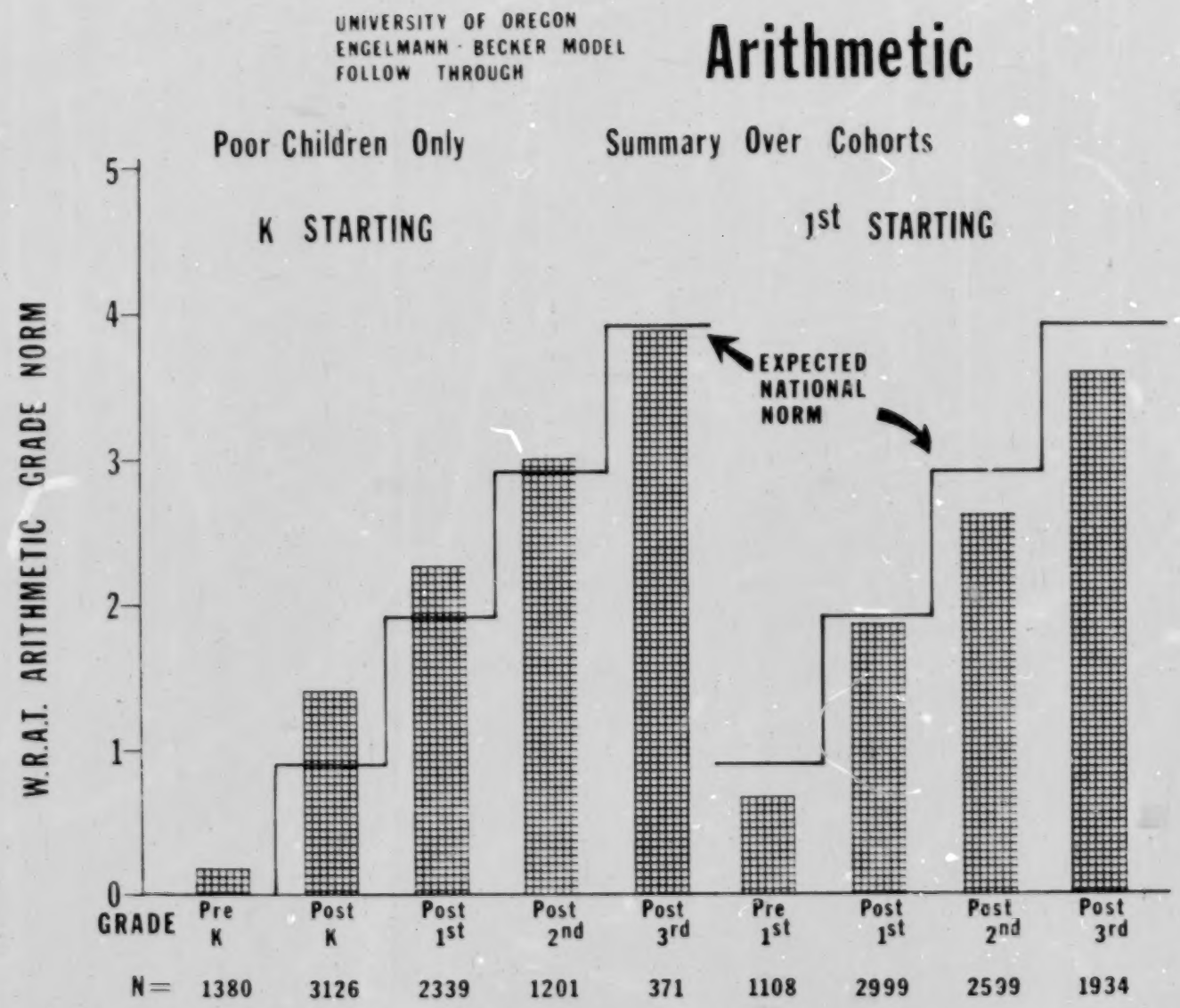
UNIVERSITY OF OREGON
ENGELMANN - BECKER MODEL
FOLLOW THROUGH
Arithmetic
Poor Children Only
Summary Over Cohorts
K STARTING
1st STARTING
W.R.A.T. ARITHMETIC GRADE NORM
5
4
3
2
1
0
EXPECTED NATIONAL NORM
GRADE
Pre K
Post K
Post 1st
Post 2nd
Post 3rd
Pre 1st
Post 1st
Post 2nd
Post 3rd
N=
1380
3126
2339
1201
371
1108
2999
2539
1934

Figure 2

Table 9 and Figure 3 presents the WRAT results for Spelling. Spelling has never been emphasized in the E-B model except as a by-product of teaching reading. We assumed that if we told the sites to keep teaching spelling that they would. However, this was not done in the early years of Follow Through because the sponsor did not formally require it. There is currently more emphasis being placed in this area. Nevertheless, the results for WRAT Spelling are close to being acceptable. K-starting poor children are almost at grade level at the end of third grade, and 1st-starting poor children are at .5 grades behind grade level.

Table 9

Average Over Cohorts by Grade Summary
WRAT Spelling

K - Starting	Gains Analysis Poor		Gains Analysis All	
	Mean	N	Mean	N
Pre K	-.09	1290	-.06	1592
Post K	1.23	3143	1.28	3807
Post 1	2.16	2345	2.22	2827
Post 2	3.04	1201	3.12	1429
Post 3	3.74	372	3.82	446

1st - Starting	Gains Analysis Poor		Gains Analysis All	
	Mean	N	Mean	N
Pre 1	.61	1102	.68	1415
Post 1	1.69	3021	1.77	4055
Post 2	2.53	2577	2.65	3417
Post 3	3.37	1937	3.61	2525

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FOLLOW THROUGH

Spelling

Poor Children Only Summary Over Cohorts

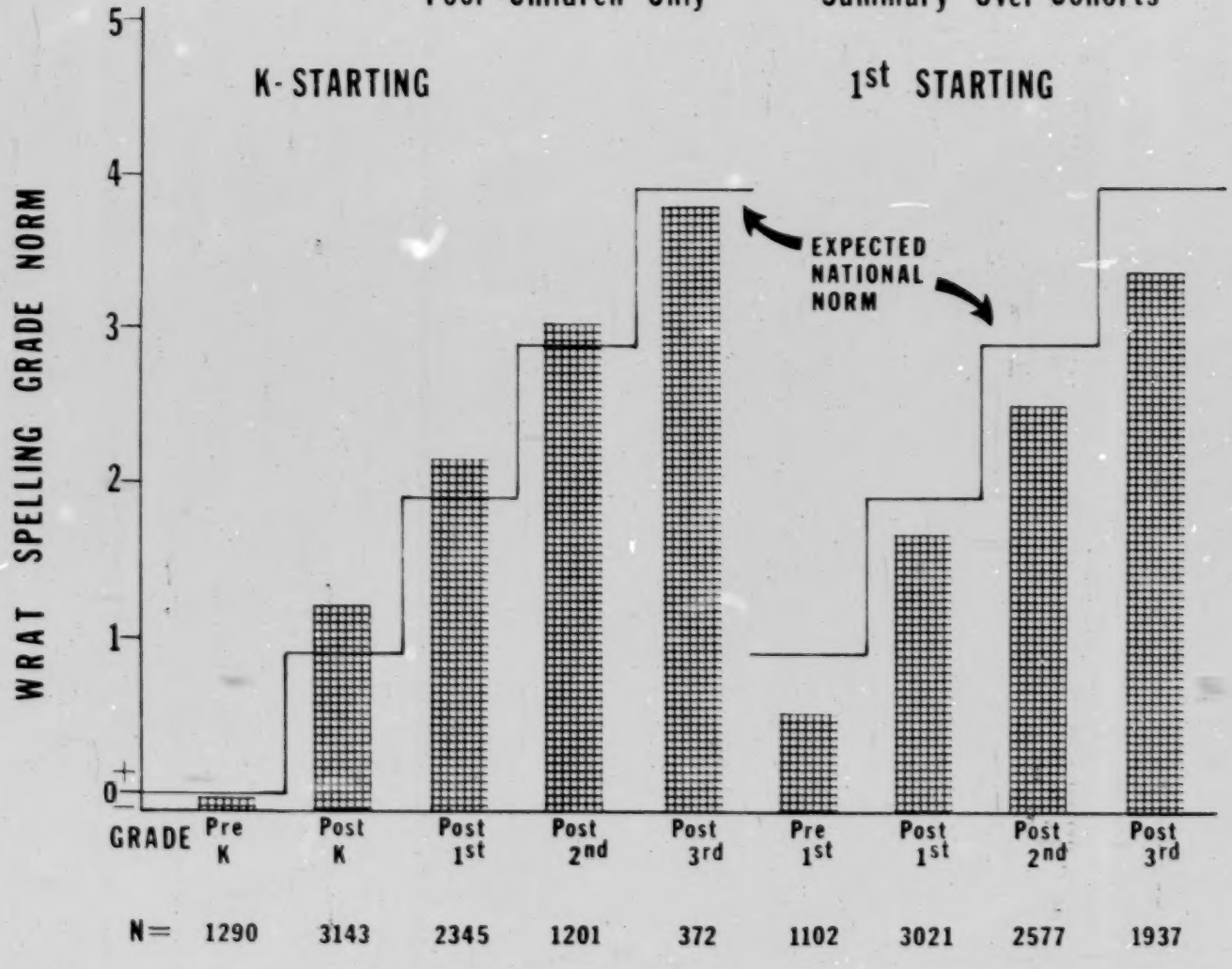

Figure 3

(2) Analysis of Gains by Cohort. Tables 10, 11, and 12 present two kinds of data. In the right-side columns, means and N's are given for all poor children with test records at a given grade-level and Cohort in the Gains Analysis. It was these means which were averaged (weighted by N) to produce the summary given in Table 7. In the left-side columns, only those children are included where there is a pretest and post-test for the grade level under consideration. At entry level, the pretest was usually given in the Fall during the first 3 weeks of school. At other levels, the "pretest" is the result from the prior spring testing.

If the reader will inspect Table 10 and the N's for Cohort 1, these differences in samples will be described again. First note at the top of the column labelled N, for Cohort 1, is the figure 633 in parentheses. This tells the total number of different children included in the Cohort 1 Gains Analysis.

Of the 633 possible children, we have a maximum of only 485 children for a true gains comparison (pre 1 - post 1) and a maximum of 556 for the average of tests at any point in time (e.g., post 1). While all this may seem excessively complicated, this approach allows us to use the largest possible sample size in drawing conclusions. If we insisted that all children from Cohort 1 in the true-gains analysis be tested at each grade level, our maximum sample size would be 49, the number pretested at entry. For Cohort 1, the gain from Pre-K to post-K was 1.16 grades; the entry mean was .03 and the post mean was 1.19 ($N = 49$). The gain from pre-1 to post-1 was 1.73 grades; the entry mean was 1.07 and the post-1 mean was 2.80 ($N = 485$). Even though the post-K mean (based on an N of 49) was different than the entry mean (based on an N of 485) the gains can be evaluated precisely and their probable importance given weight according to sample size.

(2a) Reading. Table 10 and Figures 4 and 5 present the gains analysis by Cohort for WRAT Reading for poor children. The mean gain per grade is 1.44 grade levels per year for K-starting children and 1.52 grade levels per year for 1st-starting children. Normally one would expect about .6 grade levels gain per year for poor children and 1.0 grade levels per year for the average child.

The data for 1968-69 are omitted from the figures because they are based on small N's. As can be seen in Figure 4, there is a clear trend for an improvement in level of performance in later Cohorts for K-starting children. A similar trend is not present in the data for 1st-starting sites. At the end of third grade, K-starting poor children exceed national normals by 1 grade level on the average.

(2b) Arithmetic. Table 11 and Figures 6 and 7 present the gains analysis by Cohort for WRAT Arithmetic for poor children. The mean gain per grade is 1.01 grade levels per year for K-starting children and 1.03 grade levels per year for 1st-starting children. As noted in our previous reports, the Wide Range Achievement Test is not sensitive to our program of instruction during the second level, and in earlier Cohorts we were not especially effective in getting all of the children through the arithmetic program. Figure 6 shows the poor children starting in Kindergarten reach grade-level performance at the end of 3rd grade (Cohort 1 data). Subsequent K-starting Cohorts look like they will surpass this performance. Figure 7 shows that children starting in first grade tend to fall slightly below grade level in arithmetic performance but that later Cohorts are showing improvement.

(2c) Spelling. Table 12 and Figures 8 and 9 present the gains analysis by Cohort for WRAT Spelling for poor children. The mean gain per grade is 1.09 for K-starting children, and 1.05 for 1st-starting children. Figures 8 and 9 show the gains graphically along with the cumulative levels of performance. K-starting poor children in the program are above or near grade level in each Cohort. Children starting in first grade tend to be behind in Cohorts 1 and 2 at the end of 3rd grade, but are improving in Cohorts 3 and 4.

(2d) Comment. A primary objective of Follow Through is to teach children from OEO defined poor families in such a way that they will have a chance to "make it" in school and subsequently in society. A first step to making it is the learning of basic skills at a rate that puts them on a par with their middle class peers by the end of third grade. These results suggest that the Follow Through children in our model who have a reasonable exposure to the program effects (attend at least 130 days a year) do make it.

Table 10

Analysis of Gains by Cohort
WRAT Reading Grade Norms
Poor Children Only

K- STARTING	Mean Gain	Grade Level for Gain	N	Grade Level Total in Gains Anal.	N
Cohort-0 Fall 68			(185)		(185)
Post K	--	--		1.14	65
Pre 1		1.14			
Post 1	1.77	2.91	57	2.73	166
Pre 2		2.63			
Post 2	1.74	4.37	125	4.29	135
Pre 3		4.30			
Post 3	1.33	5.62	87	5.65	89
Cohort-1 Fall 69			(633)		(633)
Pre K		.03		.04	51
Post K	1.16	1.19	49	1.06	537
Pre 1		1.07			
Post 1	1.73	2.80	485	2.77	556
Pre 2		2.73			
Post 2	1.24	3.97	402	3.92	445
Pre 3		3.85			
Post 3	1.22	5.06	258	5.07	283
Cohort-2 Fall 70			(1067)		(1067)
Pre K		.19		.17	240
Post K	1.17	1.35	214	1.35	911
Pre 1		1.34			
Post 1	1.61	2.95	808	2.89	925
Pre 2		2.89			
Post 2	1.44	4.32	589	4.33	622
Cohort-3 Fall 71			(865)		(865)
Pre K		.29		.29	259
Post K	1.23	1.52	249	1.40	831
Pre 1		1.40			
Post 1	1.76	3.16	662	3.14	695
Cohort-4 Fall 72			(881)		(881)
Pre K		.15		.13	695
Post K	1.37	1.51	634	1.48	794
Unweighted average gain	1.44				

Table 10 Cont.

Analysis of Gains by Cohort
WRAT Reading Grade Norms
Poor Children Only

1st-STARTING	Mean Gain	Grade Level for Gain	N	Grade Level Totalin Gains Anal.	N
Cohort-0 Fall 68			(651)		(651)
Post 1				1.88	525
Pre 2		1.90			
Post 2	1.44	3.34	470	3.27	589
Pre 3		3.31			
Post 3	1.66	4.95	489	4.89	535
Cohort-1 Fall 69			(1065)		(1065)
Pre 1		.23		.23	197
Post 1	1.76	1.99	176	1.88	919
Pre 2		1.90			
Post 2	1.60	3.50	811	3.45	917
Pre 3		3.40			
Post 3	1.11	4.51	745	4.44	836
Cohort-2 Fall 70			(736)		(736)
Pre 1		.39		.38	218
Post 1	1.43	1.82	199	1.81	611
Pre 2		1.82			
Post 2	1.39	3.21	559	3.15	655
Pre 3		3.17			
Post 3	1.18	4.34	538	4.33	563
Cohort-3 Fall 71			(521)		(521)
Pre 1		.35		.34	153
Post 1	1.96	2.30	143	1.98	462
Pre 2		2.00			
Post 2	1.50	3.46	399	3.45	440
Cohort-4 Fall 72			(564)		(564)
Pre 1		.40		.41	519
Post 1	1.66	2.05	467	2.03	497
Unweighted average gain	1.52				

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FOLLOW THROUGH

Reading

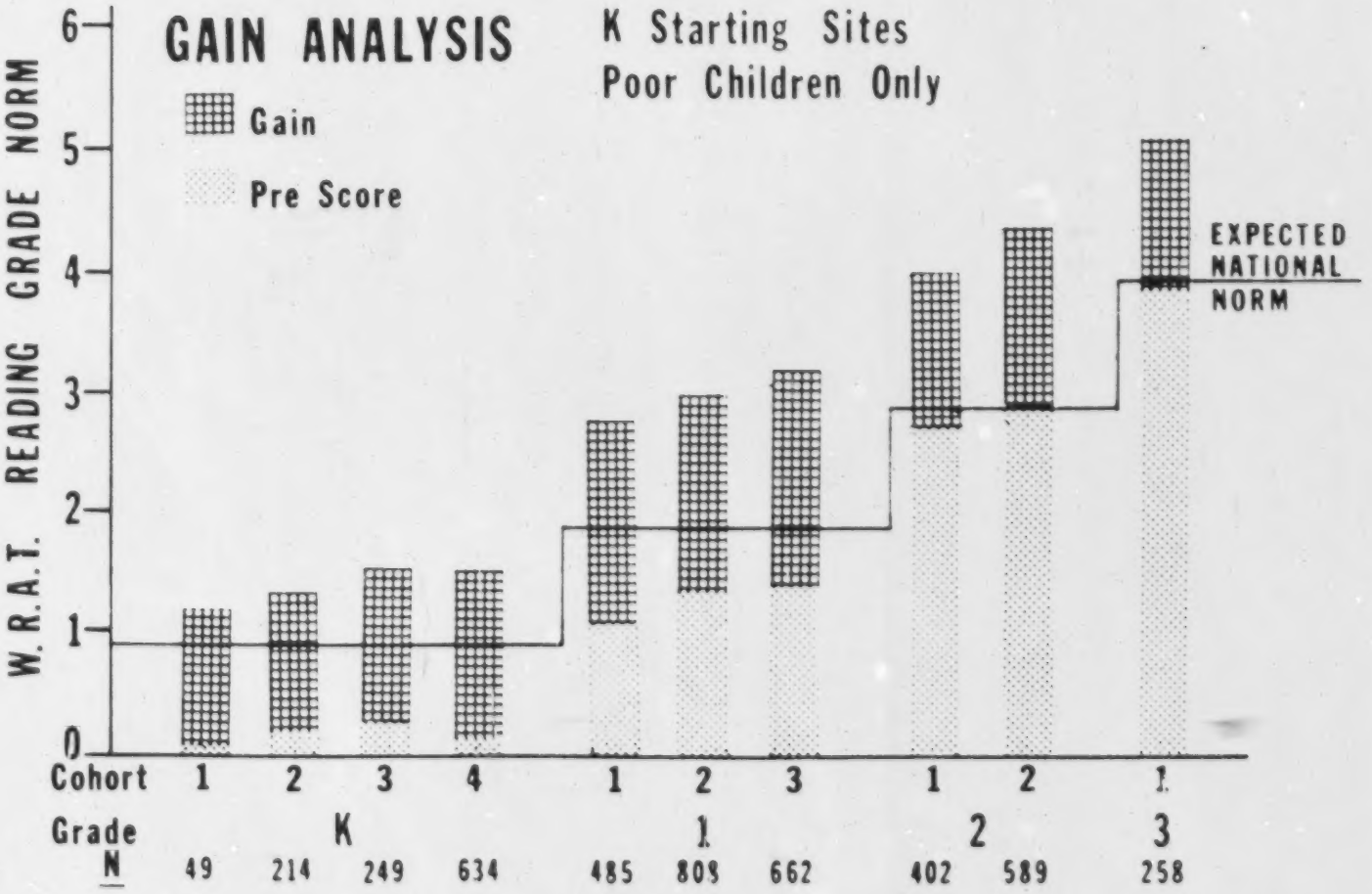

Figure 4

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FOLLOW THROUGH

Reading

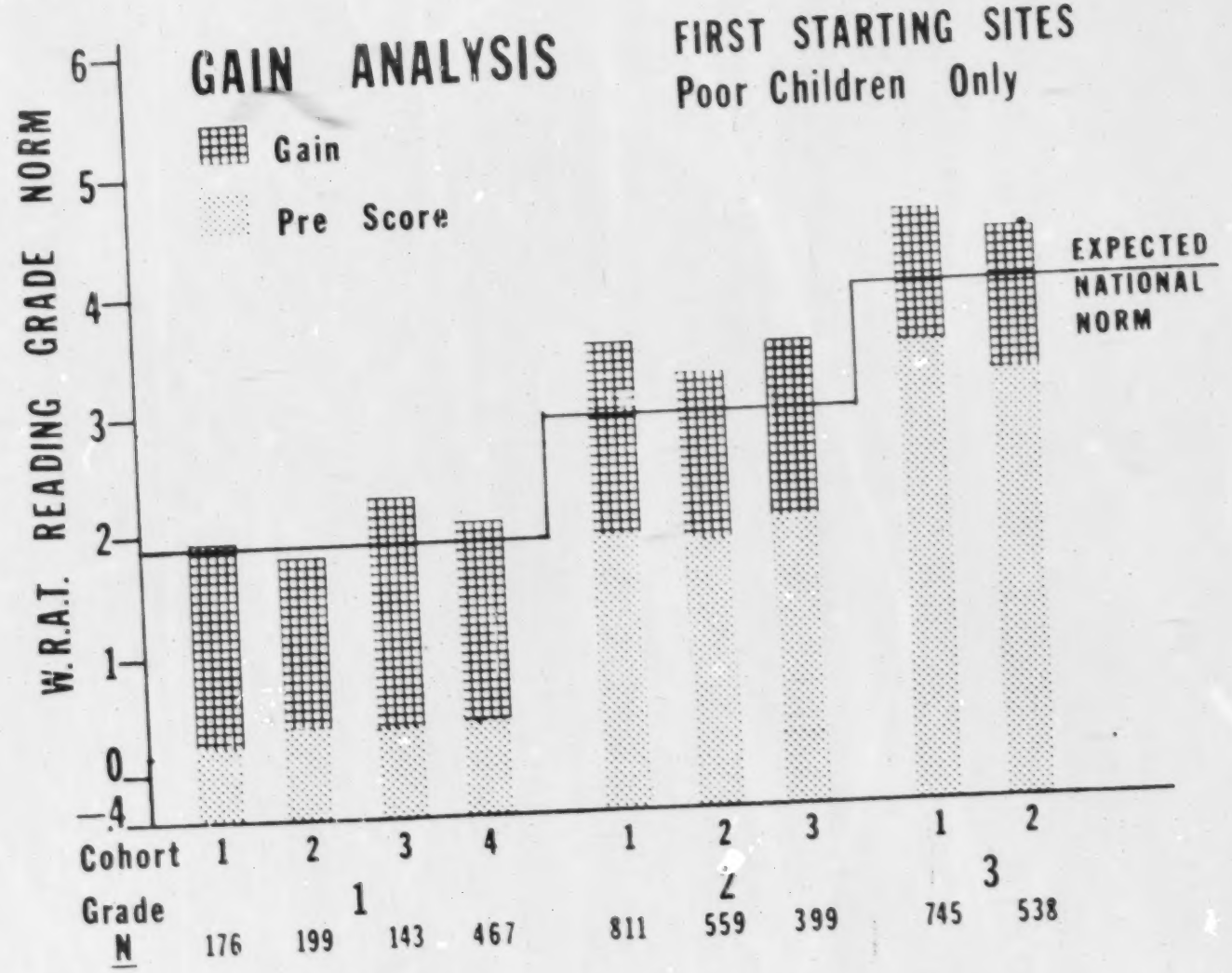

Figure 5

Table 11

Analysis of Gains By Cohort
WRAT Arithmetic Grade Norms
Poor Children Only

K - STARTING	Mean Gain	Grade Level for Gains	N	Grade Level Total in Gains Anal.	N
Cohort-0 Fall 68			(185)		(185)
Post K				1.18	67
Pre 1		1.17			
Post 1	.83	2.00	59	1.99	166
Pre 2		2.03			
Post 2	.70	2.71	123	2.69	134
Pre 3		2.76			
Post 3	1.01	3.76	87	3.77	89
Cohort-1 Fall 69			(633)		(633)
Pre K		.08		.09	58
Post K	1.23	1.30	54	1.18	538
Pre 1		1.19			
Post 1	.97	2.16	485	2.14	556
Pre 2		2.14			
Post 2	.75	2.88	403	2.87	446
Pre 3		2.90			
Post 3	.99	3.88	259	3.89	282
Cohort-2 Fall 70			(1067)		(1067)
Pre K		.20		.18	257
Post K	1.21	1.40	226	1.34	910
Pre 1		1.34			
Post 1	.92	2.24	805	2.21	922
Pre 2		2.24			
Post 2	.88	3.11	586	3.11	621
Cohort-3 Fall 71			(865)		(865)
Pre K		.30		.30	266
Post K	1.27	1.46	249	1.47	815
Pre 1		1.48			
Post 1	.98	2.45	662	2.45	695
Cohort-4 Fall 72			(881)		(881)
Pre K		.14		.13	799
Post K	1.38	1.51	724	1.50	796
Unweighted average gain	1.01				

Table 11 Cont.

Analysis of Gains by Cohort
WRAT Arithmetic Grade Norms
Poor Children Only

1st - STARTING	Mean Gain	Grade Level for Gains	N	Grade Level Total in Gains Anal.	N
Cohort-0 Fall 68			(651)		(651)
Post 1				2.01	520
Pre 2		2.02			
Post 2	.57	2.57	465	2.55	589
Pre 3		2.58			
Post 3	.91	3.48	489	3.44	535
Cohort-1 Fall 69			(1065)		(1065)
Pre 1		.79		.80	210
Post 1	1.17	1.96	185	1.77	911
Pre 2		1.79			
Post 2	.75	2.53	803	2.49	917
Pre 3		2.51			
Post 3	1.07	3.56	744	3.53	835
Cohort-2 Fall 70			(736)		(736)
Pre 1		.63		.62	225
Post 1	1.25	1.87	205	1.72	611
Pre 2		1.73			
Post 2	.92	2.64	556	2.61	652
Pre 3		2.62			
Post 3	1.10	3.72	536	3.70	564
Cohort-3 Fall 71			(521)		(521)
Pre 1		.61		.60	153
Post 1	1.43	2.03	143	1.88	461
Pre 2		1.88			
Post 2	.84	2.71	399	2.68	441
Cohort-4 Fall 72			(564)		(564)
Pre 1		.65		.64	520
Post 1	1.30	1.95	466	1.94	496
Unweighted average gain	1.03				

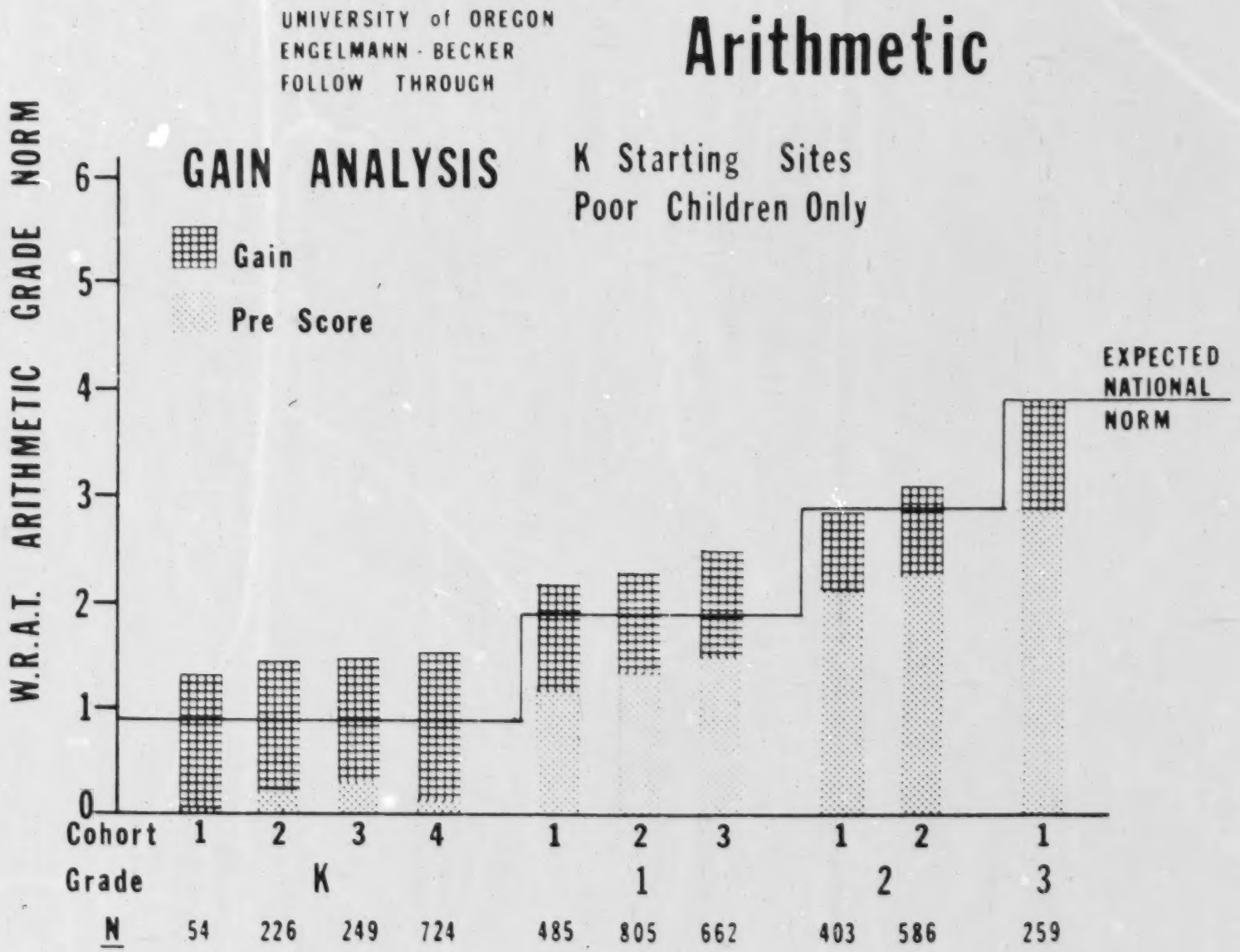
UNIVERSITY of OREGON
ENGELMANN - BECKER
FOLLOW THROUGH
Arithmetic
GAIN ANALYSIS
K Starting Sites
Poor Children Only
Gain
Pre Score
W.R.A.T. ARITHMETIC GRADE NORM
EXPECTED
NATIONAL
NORM
0
1
2
3
4
5
6
Cohort 1 2 3 4 1 2 3 1 2 1
Grade K 1 2 3
N 54 226 249 724 485 805 662 403 586 259

Figure 6

Figure 7

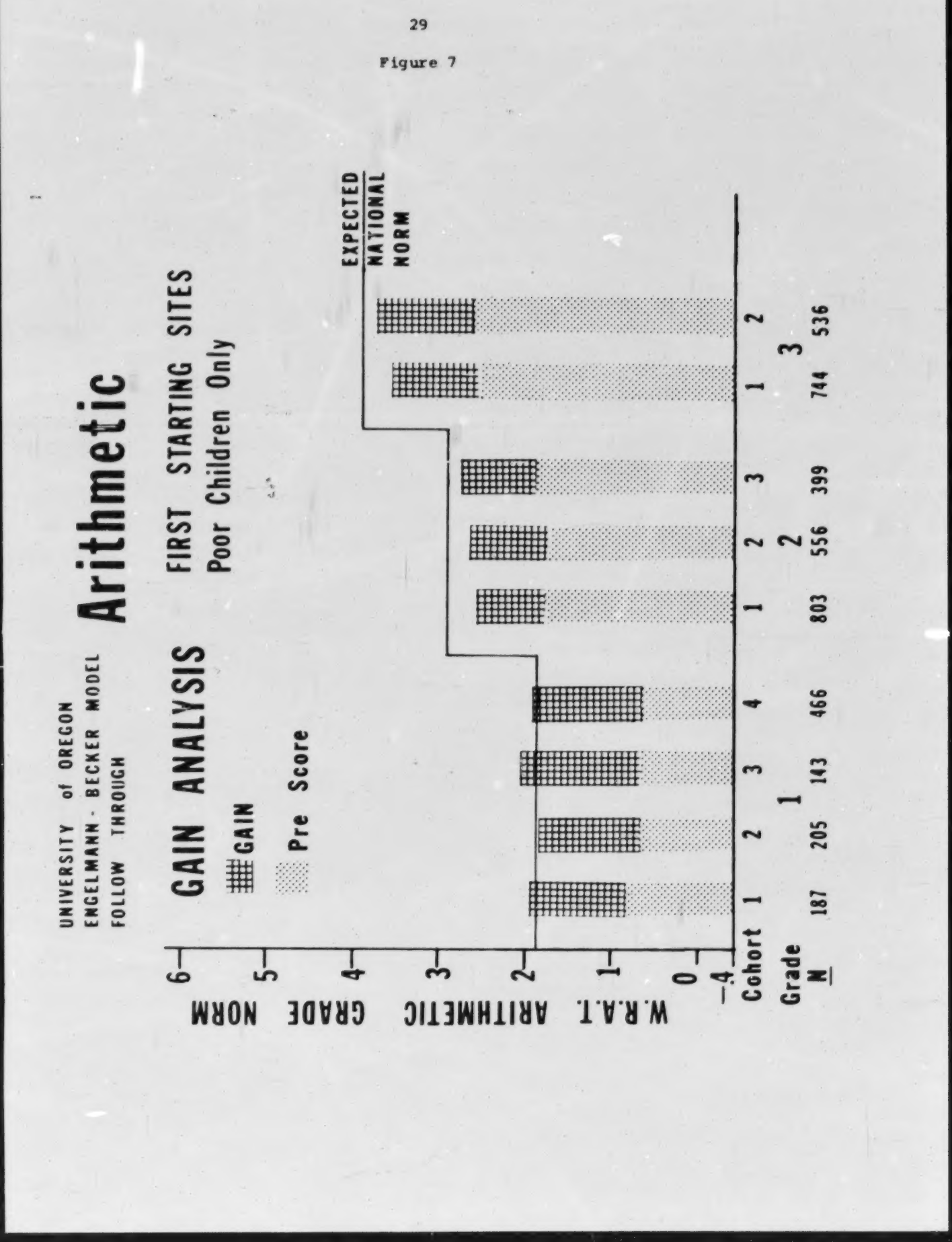
UNIVERSITY of OREGON
ENGELMANN - BECKER MODEL
FOLLOW THROUGH
Arithmetic
GAIN ANALYSIS
FIRST STARTING SITES
Poor Children Only
GAIN
Pre Score
EXPECTED
NATIONAL
NORM
W.R.A.T. ARITHMETIC GRADE NORM
6
5
4
3
2
1
0
-.4
Cohort 1 2 3 4 1 2 3 1 2
Grade 1 2 3
N 187 205 143 466 803 556 399 744 536

Table 12

Analysis of Gains by Cohort
WRAT Spelling Grade Norms
Poor Children Only

K - STARTING	Mean Gain	Grade Level for Gains	N	Grade Level Total in Gains Anal.	N
Cohort-0 Fall 68			(185)		(185)
Post K				.71	67
Pre 1		.74			
Post 1	.90	1.64	61	1.76	169
Pre 2		1.83			
Post 2	1.02	2.85	126	2.84	135
Pre 3		2.86			
Post 3	.75	3.58	88	3.58	90
Cohort-1 Fall 69			(633)		(633)
Pre K		-.39		-.42	50
Post K	1.47	1.06	46	.90	545
Pre 1		.91			
Post 1	1.21	2.11	492	2.09	558
Pre 2		2.09			
Post 2	.98	3.06	404	3.00	446
Pre 3		2.96			
Post 3	.81	3.73	259	3.77	282
Cohort-2 Fall 70			(1067)		(1067)
Pre K		-.11		- .14	253
Post K	1.34	1.22	225	1.22	911
Pre 1		1.22			
Post 1	1.00	2.21	806	2.17	923
Pre 2		2.26			
Post 2	.87	3.11	585	3.09	620
Cohort-3 Fall 71			(865)		(865)
Pre K		-.03		-.04	259
Post K	1.49	1.46	249	1.37	821
Pre 1		1.40			
Post 1	.90	2.29	667	2.28	695
Cohort-4 Fall 72			(881)		(881)
Pre K		-.05		-.06	728
Post K	1.48	1.41	664	1.36	799
Unweighted average gain	1.09				

Table 12 Cont.

Analysis of Gains by Cohort
WRAT Spelling Grade Norms
Poor Children Only

1st-STARTING	Mean Gain	Grade Level for Gains	N	Grade Level Total in Gains Anal.	N
Cohort-0 Fall 68			(651)		(651)
Post 1				1.55	532
Pre 2		1.56			
Post 2	.85	2.39	478	2.35	590
Pre 3		2.37			
Post 3	.96	3.32	490	3.30	536
Cohort-1 Fall 69			(1065)		(1065)
Pre 1		.58		.61	207
Post 1	1.17	1.72	184	1.55	923
Pre 2		1.57			
Post 2	.94	2.51	816	2.47	919
Pre 3		2.49			
Post 3	1.02	3.49	747	3.44	836
Cohort-2 Fall 70			(736)		(736)
Pre 1		.57		.56	221
Post 1	1.30	1.87	201	1.69	613
Pre 2		1.69			
Post 2	.99	2.66	541	2.62	627
Pre 3		2.61			
Post 3	.78	3.35	515	3.32	565
Cohort-3 Fall 71			(521)		(521)
Pre 1		.66		.65	154
Post 1	1.42	2.08	144	1.92	456
Pre 2		1.93			
Post 2	.86	2.76	395	2.72	441
Cohort-4 Fall 72			(564)		(564)
Pre 1		.62		.62	520
Post 1	1.21	1.88	466	1.86	497
Unweighted average gain	1.05				

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FOLLOW THROUGH

Spelling

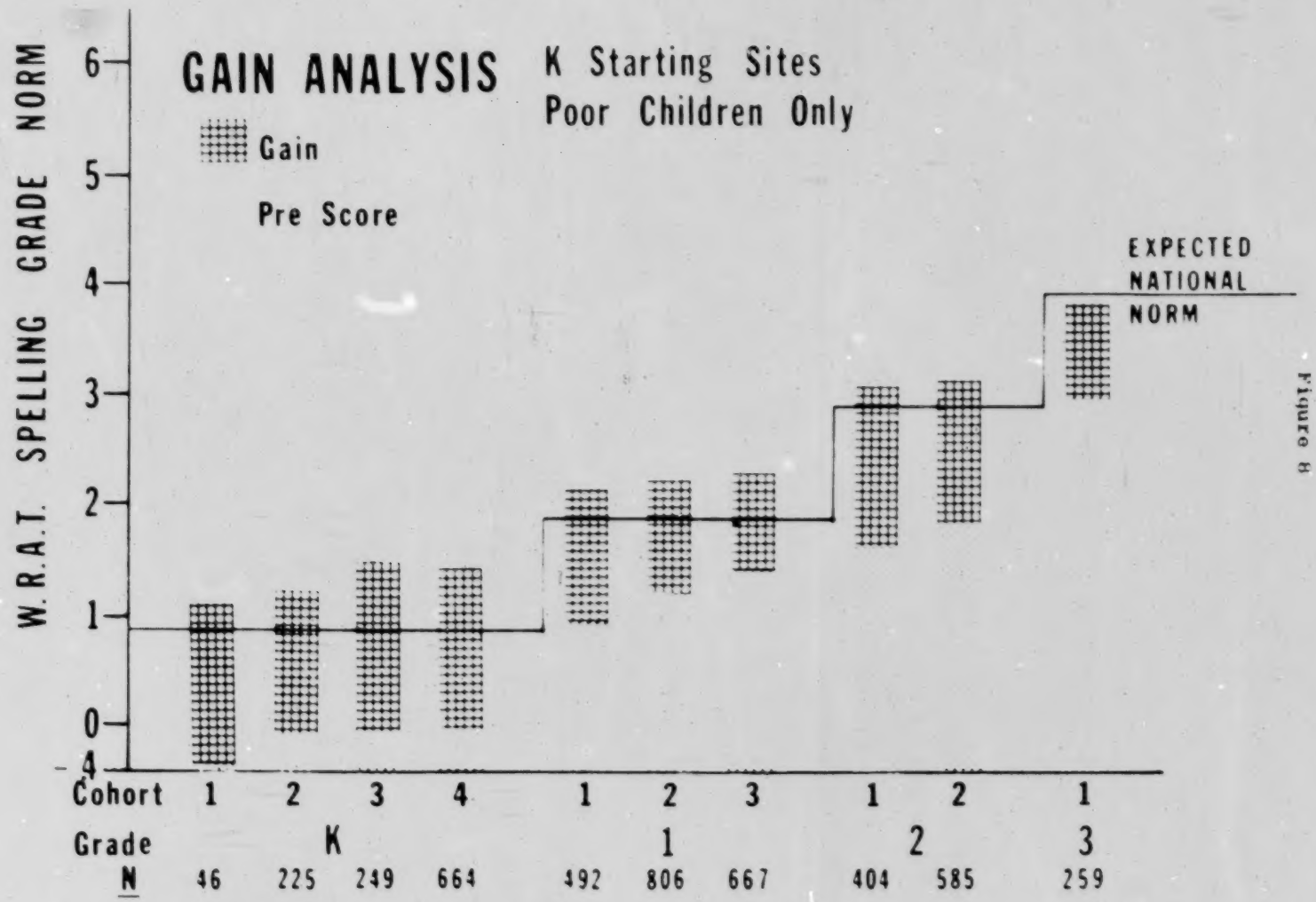

Figure 8

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FOLLOW THROUGH

Spelling

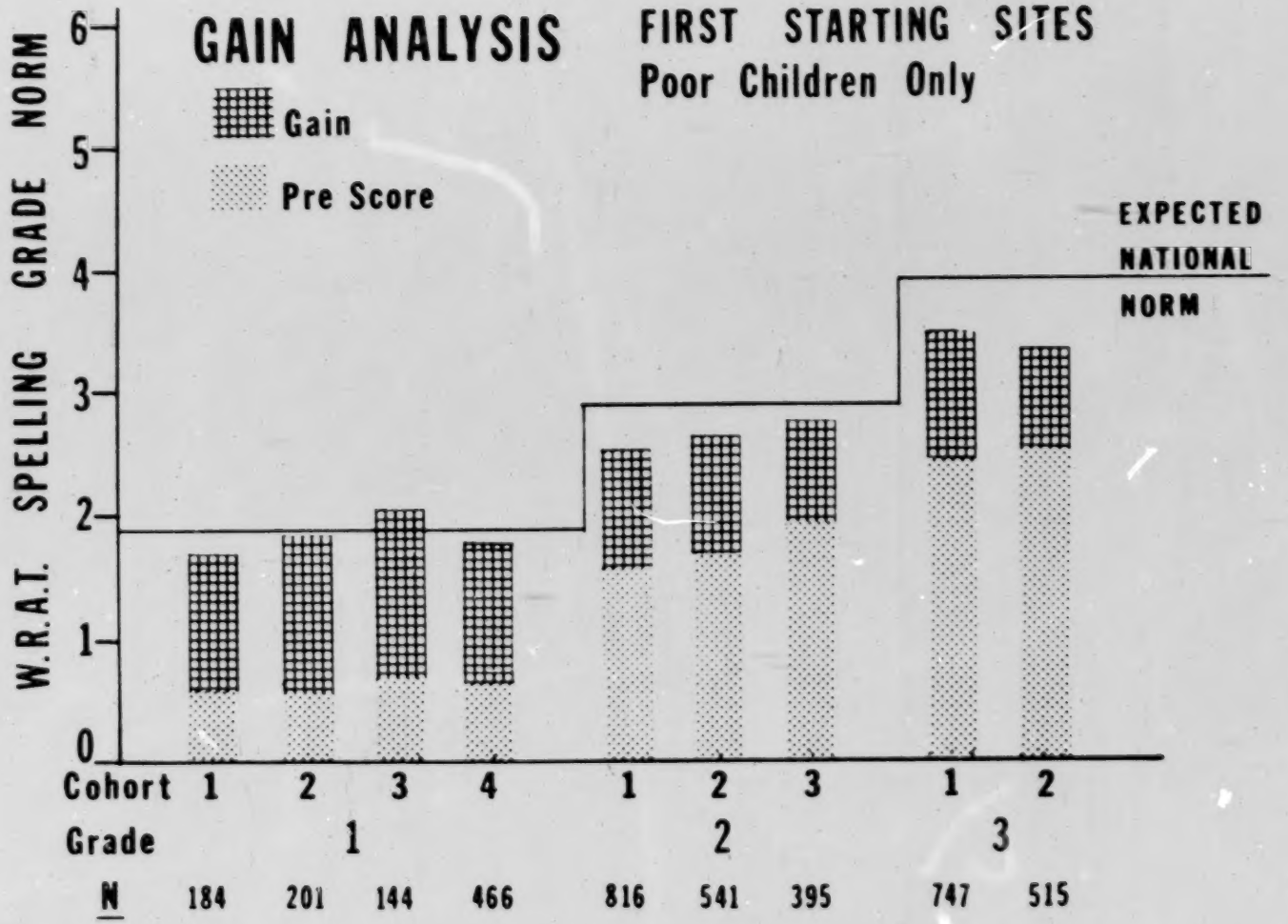

Figure 9

b. The Slosson Intelligence Test (SIT)

We included an IQ test in our test battery, not to be used as a covariate to adjust findings for the probably lower performance of poor children, but as a dependent variable to show that basic language skills such as those measures on IQ tests can be taught. In evaluating the findings to be presented, the reader should take into account that most of the instruction in our language program was by teacher aides, usually parents of the poor children. The results do not in any way represent an optimal showing of what can be done. We believe with better implementation the gain could easily be twice as much as that to be reported. Secondly, the reader should realize that the baseline for comparison of IQ means for poor children is not some steady mean level from kindergarten to third grade, but an annual declining average. Poor children tend to show a loss in IQ points of about 10 to 15 points from kindergarten to third grade.

The IQ findings from the gains analysis show an overall gain of 9.1 points maintained from pre-K to post-3rd for K-starting children. Most of the gain is made during kindergarten, and there is a possible loss during third grade (although the N is small). It will be necessary to examine results with subsequent Cohorts to confirm or refute these findings.

Poor children starting in first grade show a cumulative gain of 8.55 IQ points. These findings are based on an N of more than 1000 children at each grade level and 3 completed Cohorts. Interpretation of this result is less tenuous. The gains is clearing a progressive one. We have also included in Table 13, the results for 92 children retained a second time in third grade. They

Table 13

IQ - Gain on the Slosson
Poor Children Only

K-Starting

Cohort		Pre K-Post K	Post K-Post 1	Post 1-Post 2	Post 2-Post 3
0	Gain		6.2 (57)*	1.4 (125)	-3.3 (85)
	Basis		105.0 - 111.3	107.8 - 109.3	108.0 - 104.7
1	Gain	11.0 (52)	-.5 (482)	.3 (174)	-1.8 (71)
	Basis	105.3 - 116.3	108.1 - 107.6	111.2 - 111.6	116.8 - 115.0
2	Gain	4.2 (269)	.3 (381)		
	Basis	105.3 - 109.5	108.9 - 109.3		
3	Gain	6.7 (135)			
	Basis	108.6 - 115.3			
4	Gain	12.0 (740)			
	Basis	101.6 - 113.6			
$\bar{X}$	Gain	9.63 (1196)	1.28 (920)	.77 (299)	-2.58 (156)

Cumulative Gain Pre k - Post 3 -- 9.1 points

1st-Starting

Cohort		Pre 1-Post 1	Post 1-Post 2	Post 2-Post 3	Retentions 3rd
0	Gain	6.3 (62)	2.3 (373)	1.4 (479)	2.77 (39)
	Basis	86.6 - 93.0	95.5 - 97.8	98.7 - 100.2	85.9 - 88.7
1	Gain	-2.5 (185)	3.1 (773)	-.1 (696)	2.04 (53)
	Basis	98.9 - 96.4	97.0 - 100.1	100.1 - 100.0	83.3 - 85.3
2	Gain	3.5 (250)	1.4 (244)	2.8 (231)	
	Basis	94.3 - 97.8	97.0 - 98.3	98.2 - 101.0	
3	Gain	3.9 (51)	4.3 (42)		
	Basis	97.8 - 101.8	99.4 - 103.6		
4	Gain	8.7 (469)			
	Basis	90.9 - 99.6			
$\bar{X}$	Gain	5.02 (1017)	2.64 (1432)	1.89 (1406)	2.38 (92)

Cumulative Gain Pre 1 - Post 3 -- 8.55 points

* N in parentheses

showed a mean IQ gain of 2.38 points during this retention year. With the testings occuring a year a part, this gain is not easily chalked off to a practice effect. New skills have to be mastered to score a year higher on a mental age scale. The results could be interpreted as a statistical regression effect, but as far as we know, no child was retained because of his IQ score. Retentions were based on progress in the Distar(r) programs.

These preliminary results suggest a potentially important and powerful gain in level of general cognitive functioning as one outcome of the Engelmann-Becker Follow Through Model.

c. The Metropolitan Achievement Test

Starting in the Spring of 1973, we began to test all children not tested by SRI on the Metropolitan at the end of first, second and third grades. The Primary 1 Form was used at the end of first grade; the Primary 2 Form was used at the end of second grade; and the Elementary Form was used at the end of third grade. An analysis of the Metropolitan shows that it tested many concepts and test-taking formats that the children in our program have no prior experience with. (This analysis is available and has been provided to OE.) It should also be noted that our program gives a great emphasis to verbal-verbal interaction between teacher and child and provides less practice working in a read-the-questions, write-the-answer mode.

The spring 73 data from the Metropolitan for poor children only in the gains analysis are given in Tables 14 and 15. For K-starting children (Table 14) the results clearly show our children performing above grade level on the Metropolitan in all areas tested at the end of 1st and 2nd grades. At the end of 3rd grade, our children are at or above grade level in Language, Spelling, Math Comprehension, Math Concepts, and Total Math. They are below grade level in Math Problems, Work Knowledge, Reading and Total Reading as tested by the Metropolitan. We do not know if the differences in performance between 2nd and 3rd grades are a function of what is tested, differences between Cohorts, or program difficulties at level 3.

Comment. These findings are far above the expectation held after analysis of the test requirements. There is clear evidence that our K-starting children are learning comprehension and language skills along with reading decoding skills and math skills.

The Metropolitan data for poor children from 1st-starting sites is given in Table 15. At the end of first grade our children are at grade level in Total Reading, and are particularly strong in Word

Table 14

Metropolitan Achievement Test
Grade Norm Scores Spring 73
E-B Follow Through Model

K Starting - Poor - Gains Analysis - Spring 1973

Grade	Primary 1 1		Primary 2 2		Elementary 3	
Cohort	3 (KF71)		2 (KF70)		1 (KF69)	
	Mean	N	Mean	N	Mean	N
Word Knowledge	2.41	(591)	2.97	(553)	3.49	(252)
Word Analysis	2.25	(590)	3.11	(571)	--	
Reading	2.22	(592)	2.88	(552)	3.25	(250)
TOTAL READING	2.28	(587)	2.92	(544)	3.33	(250)
Language					4.21	(224)
Spelling			3.23	(540)	3.78	(248)
Math Comp.			2.98	(538)	4.13	(236)
Math Concepts	1.99	(591)	2.89	(570)	3.86	(236)
Math Problems			3.06	(542)	3.68	(237)
TOTAL MATH	1.99	(591)	2.83	(560)	3.86	(234)

Table 15

Metropolitan Achievement Test
Grade Norm Scores
E-B Follow Through Model

1st-Starting - Poor - Gains - Spring 1973

	Primary 1		Primary 2		Elementary	
Grade	1		2		3	
Cohort	4 (1F72)		3 (1F71)		2 (1F70)	
	Mean	N	Mean	N	Mean	N
Word Knowledge	1.88	(372)	2.60	(365)	3.03	(557)
Word Analysis	1.90	(371)	2.69	(365)		
Reading	1.68	(371)	2.49	(362)	2.86	(557)
TOTAL READING	1.78	(370)	2.53	(362)	2.91	(555)
Language					4.07	(513)
Spelling			3.01	(323)	3.32	(530)
Math Comp.			2.84	(336)	3.99	(557)
Math Concepts	1.67	(372)	2.50	(362)	3.47	(552)
Math Problems			2.71	(337)	3.50	(554)
TOTAL MATH	1.67	(372)	2.54	(360)	3.61	(550)

Knowledge and Word Analysis. They are close to grade level in Math Concepts. At the end of second grade, the children are .1 to .3 grade levels behind norm (2.8) in Reading and Total Math. On Math Comprehension and Spelling, however, they score about grade norm. At the end of third grade, our children are above norm in Math Comprehension and Language, and near norm in Total Math, but are clearly falling down on the Reading part of the Metropolitan. First-starting poor children test nearly a year behind grade level on this test.

Comment. The poor performance of our 1st-starting children on the Elementary Reading test comes as no surprise. SRI has produced similar data for all Follow Through Sponsors. It should be noted that children in our 1st-starting sites average about 10 points below our K-starting children in IQ (Table 13). They are generally weaker in the complex language comprehension skills required by the Metropolitan. Until we begin to see gain data for these children, we will not be able to disintangle test inappropriateness, from child starting levels, and from differential Cohort effects.

d. Comparisons of Children in Gains, Singles, and Dummy Analyses

The children in the gains analysis represent only 66% of the good records in our file (excluding Head Start PV for now). Because there is this selectivity in attempting to provide a clear analysis of program effects on the academic progress of poor children, it is important that the reader also have a picture of the performance of the 34% of the children in the Singles and Dummy analyses.

(1) Average Days Attendance. Table 16 summarizes the average attendance of poor children in the Gains, Singles, and Dummy analyses by Cohort. K-starting children in the Singles analyses average 2.4 days less attendance than those in the Gains analysis. There are no remarkable differences among the other groups.

(2) WRAT Reading. Comparison on WRAT Reading for Gains, Singles, and Dummy Children are given in Table 17. The comparisons show that K-starting children in the Singles Analysis average about a year behind children in the Gains Analysis at the end of first and second grades. Post kindergarten groups are comparable to those in the Gains Analysis. These results imply that many of the upper level children in the Singles Analysis entered the program late and left early. This conclusion is supported by examination of the Mean Reading Day-In-Program (Table 18) for the K-starting for children in the singles

Table 16

Average Days Attendance

K-Starting - Poor

Cohort	Gains Mean	Gains N	Singles Mean	Singles N	Dummy Mean	Dummy N
0	166	(189)	160	(35)	166	(65)
1	166	(629)	161	(195)	166	(145)
2	165	(1046)	162	(234)	166	(105)
3	168	(853)	165	(405)	159	(9)
4	165	(841)	160	(58)	-	-
Mean	**166.2**	**(3558)**	**163.8**	**(927)**	**167.8**	**(324)**
N for total records in analysis		(3631)		(1230)		(329)

1st-Starting - Poor

Cohort	Gains Mean	Gains N	Singles Mean	Singles N	Dummy Mean	Dummy N
0	167	(649)	165	(68)	165	(115)
1	167	(1058)	165	(226)	169	(113)
2	168	(719)	162	(115)	168	(87)
3	171	(511)	167	(112)	-	-
4	169	(542)	159	(19)	-	-
Mean	~~166.2~~	~~(3558)~~	~~163.8~~	~~(927)~~	167.8	(315)
N for total Records in Analysis		(3537)		(824)		(332)

Analysis. At the end of first and second grades, they are close to 100 days behind the children in the Gains Analysis.

K-starting children in the Dummy Analysis are also behind children in the Gains Analysis, but not as far (about .6 grade levels). Again Table 19 indicates that this finding is paralleled by an average Reading Day-In-Program that is below that for the children in the Gains Analysis (about 50 days). Thus K-starting children in the Singles Analysis and the Dummy Analysis have not gone as far in program and perform at a lower level on the WRAT in proportion to what they have been taught.

Examination of Tables 17 and 18 for similar comparisons for 1st-starting children shows similar trends, but the magnitude of the differences are smaller. Children in the Singles and Dummy Analyses from 1st-starting sites tend to score more like the children in the Gains Analysis. In fact, poor children from 1st-starting sites in the Singles and Dummy Analysis average above grade level in most instances.

See Tables 17 and 18

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(3) WRAT Arithmetic. Tables 19 and 20 present WRAT Arithmetic scores for the Gains, Singles, and Dummy Analyses, and corresponding Arithmetic Day-In-Program scores. The trends for K-starting children are very much like those for Reading. However, 1st-starting children in the Singles and Dummy Analyses for the most part score about the same as the children in the Gains Analysis.

See Tables 19 and 20

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(4) Language Day-In-Program. The final Table shows Day-In-Program means for Distar(r) Language for the three analyses groups. The trends again suggest that children in the Sinlges and Dummy Analyses, except at entry levels, tend not to be as far along in the program as children in the Gains Analysis.

See Table 21

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(5) Comments. Both the Singles Analysis and the Dummy Analysis contain a good number of children who entered the program late and/or left early. Presentation of the data on these groups indicates that the non-full term children tend to do more poorly in proportion to their Day-In-Program progress. The further behind they are in Day-In-Program the further behind they score at the WRAT.

Table 17

Comparison on WRAT Reading for POOR Gains,
POOR Singles, ALL Gains, ALL Singles, ALL Dummy

K - STARTING	Means Poor			Means All			N's Poor			N's All		
	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	D
Cohort-0, Fall 68												
Post K	1.14	--	--	1.18	1.26	--	65	--	--	78	39	
Post 1	2.73	1.57	2.09	2.87	1.57	2.12	166	1	27	212	1	
Post 2	4.29	2.61	3.46	4.44	2.66	3.45	135	16	56	160	17	
Post 3	5.65	2.08	4.40	5.64	2.08	4.41	89	16	54	106	16	
Cohort-1, Fall 69												
Pre K	.04	--	--	.06	--	--	51	--	--	65	--	
Post K	1.06	1.33	--	1.11	1.26	--	537	126	--	638	236	
Post 1	2.77	1.94	2.22	2.84	2.11	2.41	556	30	76	660	41	
Post 2	3.92	2.59	3.60	3.97	2.70	3.82	445	31	127	516	44	
Post 3	5.07	5.15	4.80	5.18	4.72	5.10	283	33	99	340	64	
Cohort-2, Fall 70												
Pre K	.17	--	--	.21	--	--	240	--	--	281	--	
Post K	1.35	1.40	--	1.42	1.50	--	911	183	--	1080	227	
Post 1	2.89	2.01	2.25	2.99	2.17	2.49	925	39	84	1098	47	
Post 2	4.33	4.11	3.64	4.45	3.86	3.75	622	38	95	754	62	
Cohort-3, Fall 71												
Pre K	.29	--	--	.34	--	--	259	--	--	316	--	
Post K	1.40	1.43	--	1.49	1.45	--	831	315	--	966	396	
Post 1	3.14	2.28	--	3.24	2.49	--	695	65	--	850	107	
Cohort-4, Fall 72												
Pre K	.13	.02	--	.15	.06	--	695	56	--	877	115	
Post K	1.48	1.31	--	1.56	1.58	--	794	53	--	1022	104	

Table 17 Cont.

Comparison on WRAT Reading for POOR Gains,
POOR Singles, ALL Gains, ALL Singles, ALL Dummy

ist - STARTING	Means Poor			Means All			N's Poor			N's All		
	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	Dummy
hort-0, Fall 68												
Post 1	1.88	1.10	--	2.02	2.27	--	525	1	--	744	129	--
Post 2	3.27	3.07	2.70	3.49	3.27	3.07	589	19	91	823	40	129
Post 3	4.89	4.29	4.09	5.45	4.52	4.56	535	54	110	747	83	144
hort-1, Fall 69												
Pre 1	.23	--	--	.25	--	--	197	--	--	241	--	--
Post 1	1.88	1.85	--	2.00	2.06	--	919	94	--	1167	187	--
Post 2	3.45	2.63	3.06	3.59	3.15	3.39	917	23	79	1163	33	116
Post 3	4.44	3.94	3.93	4.63	4.04	4.45	836	107	106	1053	150	150
hort-2, Fall 70												
Pre 1	.38	--	--	.41	--	--	218	--	--	258	--	--
Post 1	1.81	2.06	--	1.96	2.08	--	611	77	--	799	109	--
Post 2	3.15	2.88	3.02	3.37	2.93	2.98	655	25	72	845	40	111
Post 3	4.33	3.45	4.22	4.52	3.92	4.17	563	22	82	722	51	124
hort-3, Fall 71												
Pre 1	.34	--	--	.38	--	--	153	--	--	187	--	--
Post 1	1.98	1.79	--	2.13	1.88	--	462	49	--	650	93	--
Post 2	3.45	2.27	--	3.59	2.68	--	440	55	--	615	77	--
hort-4, Fall 72												
Pre 1	.41	--	--	.52	--	--	519	--	--	713	--	--
Post 1	2.03	1.34	--	2.21	1.31	--	497	17	--	688	52	--

Table 18

Reading Day-In-Program

K-Starting - Poor

Gains Analysis

Cohort	K Means*	K N	1 Means	1 N	2# Means	2# N	3# Means	3# N
0	-	-	124-246	(162)	249-379	(123)	366-445	(34)
1	1-138	(56)	129-274	(517)	260-383	(331)	325-416	(61)
2	1-158	(317)	151-296	(804)	288-404	(498)	-	-
3	1-159	(272)	150-290	(599)	-	-	-	-
4	1-146	(663)	-	-	-	-	-	-

Singles Analysis

Cohort	K Means	K N	1 Means	1 N	2 Means	2 N	3 Means	3 N
0	-	-	-	-	257	(17)	255	(18)
1	137	(131)	214	(37)	274	(31)	393	(33)
2	137	(203)	183	(36)	313	(35)	-	-
3	153	(315)	189	(64)	-	-	-	-
4	142	(47)	-	-	-	-	-	-

Dummy

Cohort	K Means	K N	1 Means	1 N	2 Means	2 N	3 Means	3 N
0	-	-	-	-	152-304	(35)	247-380	(3)
1	-	-	-	-	206-347	(62)	290-405	(59)
2	-	-	-	-	187-342	(72)	-	-

*Where two values are given, they indicate the mean starting value and ending value. Where one value is given it is the mean ending value.

#Children out of program not included. Terminal means are therefore underestimated. A revised analysis is in progress to fix this.

Table 18 Cont.

Reading Day-In-Program

1st-Starting - Poor

Gains Analysis

Cohort	1 Means*	N	2# Means	N	3# Means	N
0	1-114	(61)	137-299	(521)	300-427	(468)
1	1-168	(195)	163-322	(827)	310-428	(578)
2	1-169	(269)	168-324	(691)	320-444	(409)
3	1-173	(177)	172-319	(321)	-	
4	1-159	(364)				

Singles Analysis

Cohort	1 Means	N	2 Means	N	3 Means	N
0	84	(1)	279	(21)	408	(61)
1	156	(97)	289	(26)	422	(102)
2	163	(91)	320	(25)	463	(21)
3	164	(50)	268	(27)	-	
4	142	(18)	-		-	

Dummy

Cohort	1 Means	N	2 Means	N	3 Means	N
0	-	-	-	-	270-414	(77)
1	-	-	-	-	292-429	(62)
2	-	-	-	-	293-425	(40)

*Where two values are given, they indicate the mean starting value and ending value. Where one value is given it is the mean ending value.

#Children out of program not included. Terminal means are therefore underestimated. A revised analysis is in progress to fix this.

Table 19

Comparison on WRAT Arithmetic for POOR Gains, POOR Singles, ALL Gains, ALL Singles, ALL Dummy

K - STARTING	Means Poor			Means All			N's Poor			N's All		
	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	D
Cohort-0, Fall 68												
Post K	1.18	--	--	1.23	1.32	--	67	--	--	80	39	
Post 1	1.99	2.25	1.80	2.04	2.25	1.81	166	1	31	212	1	
Post 2	2.69	2.31	2.58	2.73	2.34	2.59	134	16	56	159	17	
Post 3	3.77	2.72	3.23	3.79	2.72	3.32	89	15	54	106	15	
Cohort-1, Fall 69												
Pre K	.09	--	--	.09	--	--	58	--	--	72	--	
Post K	1.18	1.21	--	1.22	1.22	--	538	126	--	639	236	
Post 1	2.14	1.83	1.86	2.16	1.88	1.93	556	30	76	660	41	
Post 2	2.87	2.26	2.65	2.90	2.33	2.72	446	32	126	517	45	
Post 3	3.89	3.96	3.69	3.94	3.79	3.84	282	34	98	339	65	
Cohort-2, Fall 70												
Pre K	.18	--	--	.24	--	--	257	--	--	299		
Post K	1.34	1.32	--	1.37	1.37	1.94	910	183	--	1079	227	
Post 1	2.21	1.74	1.89	2.23	1.85	2.82	922	39	84	1096	47	
Post 2	3.11	2.98	2.85	3.16	2.84	3.29	621	38	91	753	64	
Cohort-3, Fall 71												
Pre K	.30	--	--	.35	--	--	266	--	--	322	--	
Post K	1.47	1.37	--	1.52	1.39	--	815	314	--	965	393	
Post 1	2.45	1.98	--	2.48	2.07	--	695	65	--	851	107	
Cohort-4, Fall 72												
Pre K	.13	.11	--	.14	.14	--	799	64	--	1001	126	
Post K	1.50	1.35	--	1.55	1.40	--	796	54	--	1024	105	

Table 19 Cont.

Comparison on WRAT Arithmetic for POOR Gains,
POOR Singles, ALL Gains, ALL Singles, ALL Dummy

ast - STARTING	Means Poor			Means All			N's Poor			N's All		
	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	Dummy	Gains	Singles	Dummy
Cohort-0, Fall 68												
Post 1	2.01	1.40	--	2.06	2.24	--	520	1	--	736	130	--
Post 2	2.55	2.53	2.44	2.64	2.61	2.62	589	20	92	821	41	130
Post 3	3.44	3.51	3.28	3.64	3.53	3.44	535	54	110	747	83	144
Cohort-1, Fall 69												
Pre 1	.80	--	--	.82	--	--	210	--	--	255	--	--
Post 1	1.77	1.80	--	1.83	1.82	--	911	94	--	1159	188	--
Post 2	2.49	2.30	2.50	2.56	2.51	2.66	917	23	79	1162	30	116
Post 3	3.53	3.64	3.56	3.66	3.65	3.71	835	107	105	1052	150	149
Cohort-2, Fall 70												
Pre 1	.62	--	--	.67	--	--	225	--	--	265	--	--
Post 1	1.72	1.78	--	1.79	1.81	--	611	77	--	800	109	--
Post 2	2.61	2.79	2.81	2.69	2.69	2.79	652	25	72	842	40	111
Post 3	3.70	3.74	3.95	3.80	3.74	3.94	564	22	82	723	51	123
Cohort-3, Fall 71												
Pre 1	.60	--	--	.62	--	--	153	--	--	187	--	--
Post 1	1.88	1.79	--	1.95	1.77	--	461	49	--	649	93	--
Post 2	2.68	2.35	--	2.79	2.52	--	441	56	--	616	78	--
Cohort-4, Fall 72												
Pre 1	.64	--	--	.72	--	--	520	--	--	714	--	--
Post 1	1.94	1.86	--	2.21	1.63	--	496	17	--	688	52	--

Table 20

Arithmetic Day-In-Program

K-Starting - Poor

Gains Analysis

Cohort	K Means*	K N	1 Means	1 N	2# Means	2# N	3# Means	3# N
0	-	-	88-254	(114)	260-387	(106)	338-488	(36)
1	1-157	(56)	154-281	(515)	276-430	(395)	370-497	(60)
2	1-186	(317)	176-332	(813)	321-449	(501)	-	-
3	1-210	(271)	199-344	(591)	-	-	-	-
4	1-200	(664)	-	-	-	-	-	-

Singles Analysis

Cohort	K Means	K N	1 Means	1 N	2 Means	2 N	3 Means	3 N
0	-	-	-	-	265	(17)	244	(18)
1	155	(131)	219	(36)	328	(31)	448	(34)
2	156	(203)	226	(36)	371	(28)	-	-
3	205	(314)	217	(64)	-	-	-	-
4	193	(47)	-	-	-	-	-	-

Dummy

Cohort	K Means	K N	1 Means	1 N	2 Means	2 N	3 Means	3 N
0	-	-	-	-	166-310	(32)	333-450	(33)
1	-	-	-	-	236-401	(73)	313-460	(44)
2	-	-	-	-	221-380	(79)	-	-

*Where two values are given, they indicate the mean starting value and ending value. Where one value is given it is the mean ending value.

#Children out of program not included. Terminal means are therefore underestimated. A revised analysis is in progress to fix this.

Table 20 Cont.

Arithmetic Day-In-Program

1st-Starting - Poor

Gains Analysis

Cohort	1 Means*	N	2# Means	N	3# Means	N
0	1-106	(61)	127-337	(496)	331-484	(362)
1	1-203	(195)	194-348	(831)	322-495	(462)
2	1-213	(269)	202-375	(590)	258-496	(313)
3	1-236	(177)	236-392	(325)	-	-
4	1-231	(363)	-	-	-	-

Singles Analysis

Cohort	1 Means	N	2 Means	N	3 Means	N
0	-	-	319	(21)	502	(62)
1	183	(98)	307	(25)	502	(102)
2	197	(92)	386	(25)	527	(22)
3	212	(50)	353	(28)	-	-
4	207	(17)	-	-	-	-

Dummy

Cohort	1 Means	N	2 Means	N	3 Means	N
0	-	-	-	-	313-486	(66)
1	-	-	-	-	301-494	(52)
2	-	-	-	-	353-478	(37)

*Where two values are given, they indicate the mean starting value and ending value. Where one value is given it is the mean ending value.

#Children out of program not included. Terminal means are therefore underestimated. A revised analysis is in progress to fix this.

Table 21

Language Day-In-Program

K-Starting - Poor

Gains Analysis

Cohort	K Means*	K N	1 Means	1 N	2# Means	2# N	3# Means	3# N
0			138-281	(121)	284-406	(122)	381-473	(41)
1	1-154	(56)	159-302	(510)	298-411	(396)	360-459	(73)
2	1-191	(317)	177-312	(813)	299-411	(486)	-	-
3	1-203	(272)	190-321	(594)	-	-	-	-
4	1-176	(663)	-	-	-	-	-	-

Singles Analysis

Cohort	K Means	K N	1 Means	1 N	2 Means	2 N	3 Means	3 N
0					332	(17)	194	(18)
1	164	(126)	233	(36)	293	(31)	407	(34)
2	161	(204)	241	(36)	323	(36)	—	—
3	196	(314)	194	(62)	—	—	—	—
4	164	(47)	—	—	—	—	—	—

Dummy

Cohort	K Means	K N	1 Means	1 N	2 Means	2 N	3 Means	3 N
0	—	—	—	—	165-335	(35)	339-451	(50)
1	—	—	—	—	236-370	(70)	295-413	(47)
2	—	—	—	—	224-348	(74)	—	—

*Where two values are given, they indicate the mean starting value and ending value. Where one value is given it is the mean ending value.

#Children out of program not included. Terminal means are therefore underestimated. A revised analysis is in progress to fix this.

Table 21 Cont.

Language Day-In-Program

1st-Starting - Poor

Gains Analysis

Cohort	1 Means*	N	2# Means	N	3# Means	N
0	1-148	(61)	137-314	(500)	312-464	(392)
1	1-178	(195)	175-331	(823)	320-461	(510)
2	1-200	(269)	191-353	(592)	349-469	(395)
3	1-218	(177)	218-362	(325)	-	-
4	1-190	(364)	-	-	-	-

Singles Analysis

Cohort	1 Means	N	2 Means	N	3 Means	N
0	-	-	303	(21)	463	(59)
1	173	(96)	309	(25)	461	(100)
2	184	(91)	353	(25)	477	(22)
3	206	(50)	346	(28)	-	-
4	161	(18)	-	-	-	-

Dummy

Cohort	1 Means	N	2 Means	N	3 Means	N
0	-	-	-	-	310-459	(71)
1	-	-	-	-	319-468	(55)
2	-	-	-	-	345-457	(52)

*Where two values are given, they indicate the mean starting value and ending value. Where one value is given it is the mean ending value.

#Children out of program not included. Terminal means are therefore underestimated. A revised analysis is in progress to fix this.